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RADIUM

EDITED BY
CHARLES H. VIOL, Ph. D.
AND
WILLIAM H. CAMERON, M. D.

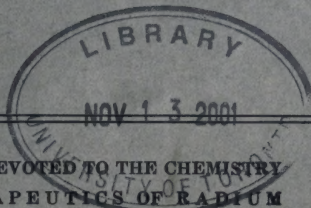
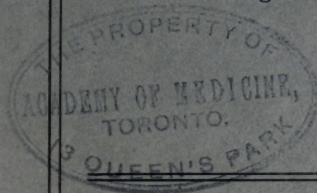
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A MONTHLY JOURNAL DEVOTED TO THE CHEMISTRY
PHYSICS AND THERAPEUTICS OF RADIUM
AND RADIO-ACTIVE SUBSTANCES

RADIUM

A MONTHLY JOURNAL DEVOTED TO THE CHEMISTRY, PHYSICS AND
THERAPEUTICS OF RADIUM AND RADIO-ACTIVE SUBSTANCES.

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VOL. VIII.

OCTOBER, 1916

No. 1

AN ADDITIONAL CONTRIBUTION TO THE THERAPEUTIC VALUE OF RADIUM IN PELVIC CANCERS¹

By HENRY SCHMITZ, A. M., M. D., F. A. C. S., Chicago.

In accordance with the statement made in my previous articles (1 and 2)—“The Action of Radium on Cancers of the Pelvic Organs,” and “The Primary Results of Radium Treatment in Uterine and Rectal Cancers”—in which reports were made as to the use of radium in 41 cases of cancers of the pelvic organs, I submit below a review as to the present status of these cases and include in addition the histories of cases which have come under my care up to April 1, 1916.

The total number of cases of malignant disease of the pelvic organs treated to date is 80; 62 of these are uterine, 10 rectal, and 8 vesical cancers (see Table 1).

The clinical results of radium therapy depend upon the method of application. My technique has been changed repeatedly as I have gained experience in the course of two years, and therefore I believe it would not be amiss to describe my present method of applying radium.

TECHNIQUE USED IN RADIUM THERAPY

The therapeutic action of radium depends on (1) the amount of radium element, (2) the method of screening, (3) the extent of the time of the exposure, and (4) the distance maintained between the radium and the tumor mass.

¹ I. Surgery, Gynecology and Obstetrics, XXIII, 191-202, August, 1916. Inaugural thesis, Chicago Gynecological Society, June 23, 1916.

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The quantity of radium at my disposition is 100 milligrams of radium element in the form of radium barium sulphate of a purity of about 60 to 70 per cent. However, I have used uniformly 50 milligrams in treating the cancers referred to in this monograph. The duration of a course of treatment has been on an average of 40 to 48 hours, i.e., 2,000 to 2,400 milligram hours. The radio-active substance is applied at intervals, so that a course of treatment does not consume more than eight days. The first application lasts from 20 to 24 hours. The interval time between the applications varies from 12 to 36 hours. The amount of milligram hours of radium element necessary in a given case is determined by the local conditions present, which are elicited by a painstaking bimanual examination. A carcinoma extending a distance of 1 centimeter from the radium becomes destroyed by the gamma-rays of 50 milligrams radium element within 12 hours; an exposure of 48 hours is necessary to destroy carcinoma-tissue within a distance of 2 centimeters, and 128 hours within a distance of 3 centimeters. The duration of the exposure may be reduced by employing larger amounts of radium element. For instance, if gamma-rays of 100 milligrams of radium element are used then the time exposures given above may be practically reduced by one-half. However, the use of larger amounts of radium element, say 200 or 300 milligrams, does not proportionally increase the action of radium, unless the tubes are inserted in different regions of the tumor mass, so that each 100 milligrams acts independently of the others (3).

These facts—the determination of the amount of gamma-rays and the duration of treatment necessary to influence a carcinoma-growth—are based on the law of radiation and on experimentation in the living human body.

The intensity of the action of radium rays varies inversely as the square of the distance. If the distance of the tumor from the source of energy, i. e., the radium, is doubled, the time of exposure must be quadrupled. Should the radium capsule be kept 1 centimeter from the tumor mass, then the time of duration of the action of radium in the first centimeter of tissue must be quadrupled, in the second it must be multiplied by nine, and in the third by sixteen (4).

The experiments in the human body were carried out in recurrent breast cancers, characterized by the formation of multiple nodules. A nodule was removed under local anaesthesia and subjected to a microscopic examination to determine the pathological nature. Then the gamma rays of 50 milligrams of radium element were applied for 4 hours to another nodule, for 6 hours to a second one, for 8 hours to a third one, for 10 hours to a fourth one, for 12 hours to a fifth one, and so on. After ten days the nodules were removed and subjected to a microscopic examination. We were particularly careful to note the distance of the nodule from the skin surface. In this manner we could repeatedly demonstrate the fact that the gamma-rays of 50 milligrams radium element destroyed carcinoma-tissue within a distance of 1 centimeter after an application of about 12 hours, i.e., 600 milligram hours. The receptivity of carcinoma-tissue toward the gamma-rays varies depending upon the age of the individual and the corresponding difference in the vascularity of the tissues as well as on the variety of the carcinoma-cell (5). For practical reasons the above dosage of milligram hours, when 50 milligrams of radium element are used, may be considered as lethal.

The method of screening is simple as gamma-rays only must be used in pelvic organs. The alpha-rays are arrested by the glass capsule, in which the radium salt is contained. The beta-rays are absorbed by 1.2 millimeters brass, silver, or lead. Brass screens were used as they are cheaper and cleaner than the other metals. The secondary or Sagnac rays formed in the metal screens are arrested by a para rubber tube of 2 millimeters thickness or about six to eight layers of No. 2 gauze surrounded by a rubber finger obtained from a discarded surgical glove. The screens are built so that the radium capsules may be arranged in tandem or twin formation. The tandem is used intra-uterinely, rectally, or vesically, while the twin is employed on large surfaces as a crater in

TABLE I—PELVIC CARCINOMATA

Treated with Radium from April 1, 1914, to April 1, 1916

Variety of Cancer	Total Number	Primary Subjective Result		Primary Objective Result		Present Condition		
		Improved	Unimproved	Improved	Unimproved	Clinically Well	Unimproved	Died
Carcinoma uteri inoperabile	35	23	12	21	14	11	4	20
Carcinoma uteri operabile	12	11	1	11	1	7	2	3
Carcinoma uteri recurrens	15	10	5	10	5	4	2	9
Total	62	44	18	42	20	22	8	32
Carcinoma recti	10	6	4	6	4	2	3	5
Carcinoma vesicae	8	7	1	5	3	3	2	3
Grand total	80	57	23	53	27	27	13	40

the cervix. The local conditions found present, therefore determine the arrangement of the capsules (see figs. 1 and 2). We are especially careful to protect normal tissue from the gamma-rays by suitably formed lead plates protected with heavy rubber sheeting to arrest any secondary rays that might form in the lead. We choose lead sheeting for this purpose as it is pliable and can be cut with scissors to any size or shape desired.

The rays of radium strike the tissues with a greater uniformity of intensity the further the distance between the capsule and the tissues, as the rays become almost parallel or homogenous. This principle is advocated by Dessauer in massive roentgen raying (6). The advantage thus gained is more than lost by the decrease in the intensity of the rays (7). We attempt to bring the capsule as close to the tissues as possible.

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Crossfiring should be employed whenever possible (8). If a carcinoma is found in the anterior rectal wall, a radium capsule should be inserted in the rectum and another one in a corresponding position within the vagina; if in the posterior rectal wall, in the rectum and between the anal or perineal fold; if in the posterior vesical wall, in the bladder and vagina; if in the anterior vesical wall, in bladder and suprapubically, and so forth.

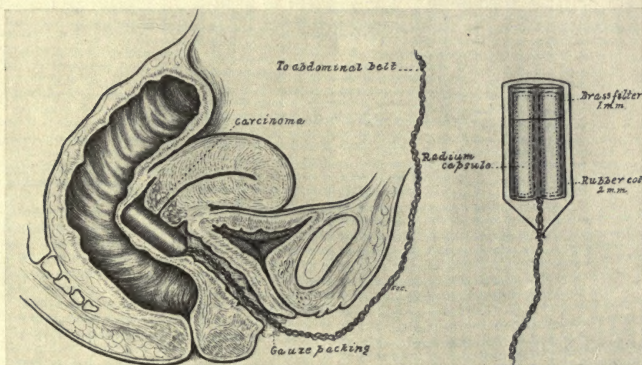


Fig. 1. Application of radium to cervix and vagina. Tubes in "twin" applicator.

Special radium carriers are required for rectal and vesical applications. For the former I use a cup with a perforation in the center and held in place by double rubber bands fastened to a belt around the abdomen. The radium carrier is attached to a brass rod which is surrounded by rubber tubing. The latter arrests also the secondary rays. The length of the rubber tubing is determined by the distance of the growth from the cup. The brass rod passes through while the rubber tube rests on it. The carrier by this arrangement remains movable and therefore becomes automatically adjusted to any position the patient might assume. In vesical cancers I place the radium capsule in a urethral catheter. Two fenestra are made in the catheter beneath the radium capsule. As vesical cancers are usually located in the trigone, the position of the catheter within the bladder is indicated by the escape of urine through the tube. The latter is then secured in place by adhesive plaster. A rubber tube attached to the catheter directs the urine into a bottle. Continuous drainage is thus secured, making possible long continued applications of radium within the bladder.

After the first course of radium treatment the patient is requested to return weekly for re-examinations. The latent action of radium reaches its height within 21 days. Should the patient not exhibit at this time a marked improvement in the local condition, indicated by a decrease in the size of the tumor, another course like the first one is given. If the patient shows a marked improvement, then the second seance is postponed for another three weeks. Further applications are

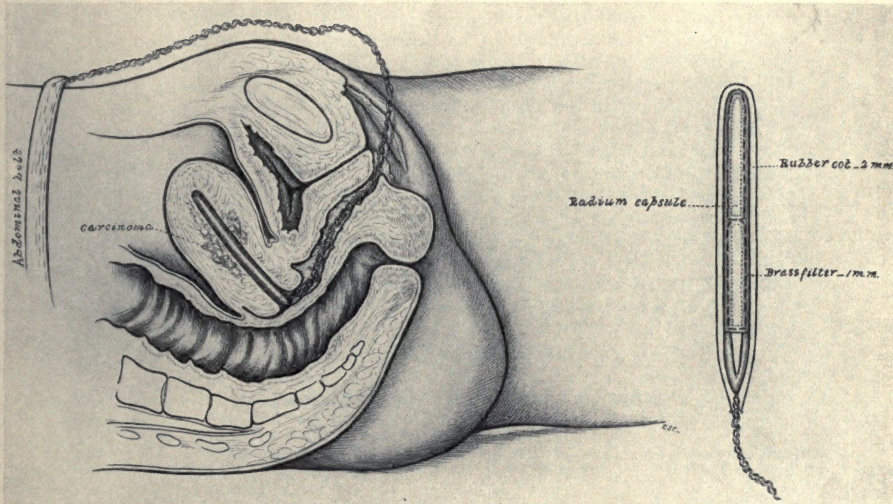


Fig. 2. Radium inserted in cavity of uterus, "tandem" arrangement.

thereafter given when indicated by a persistence or a reappearance of the tumor. The patient is requested to return for examination every four weeks after a clinical cure has been obtained.

Strictest asepsis must be observed in the application of radium. Instruments and applicators must be rendered sterile by boiling. The field of operation must be prepared as for any operation. The surgeon, also must prepare as he would for the performance of any operation and protect the hands with sterile rubber gloves.

THE USE OF MASSIVE ROENTGEN RAYS IN CONJUNCTION WITH RADIUM TREATMENT.

We cannot determine by bimanual examination whether the regional lymphodes are or are not metastatically invaded by the carcinoma. Therefore, we apply massive X-rays to the glands through the anterior abdominal wall by the multiple field crossfire method of Gauss. We use Coolidge and water-cooled roentgen tubes. As the vacuum or hardness obtainable in the water-cooled tubes is higher than in the Coolidge, we prefer the former. However, the use of the roentgen tube involves a greater expenditure in the time of the exposure, but the higher vacuum obtainable insures a greater penetration. This, after all, determines the preference for the water-cooled tube.

Thirty to fifty erythema doses are necessary to destroy a malignant growth within 20 centimeters of the surface of the abdominal wall. It

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requires seven times this amount, that is 350 erythema doses to remove metastases near the posterior pelvic walls, which are about 10 centimeters distant from the suprapubic region (9). The roentgen tube should have a hardness of twelve to thirteen and a half, as determined by a Wehnelt penetrometer. It should carry a critical current of 4 to 5 milliamperes. Its constancy must be maintained by a continuous flow of cold water around the anode and an interruption of the current for a half second out of every second, while in use to keep the tube cool, and thereby retain the hardness for an indefinite length of time. The distance of the anode from the body should be 21 centimeters. The rays should be filtered through a three-millimeter aluminum screen, to exclude the soft rays. Under these conditions 10 to 12 erythema doses may be obtained per hour. If three sances of one hour each are given daily, 10 to 14 days are necessary to reach an amount of 350 erythema doses. If we use six fields as portals of entrance, we must apply about 60 erythema doses to each field. Bumm does not hesitate to apply 100 to a field (10).

The time of exposure can be reduced by using a Coolidge tube.

TABLE II.—CARCINOMA UTERI INOPERABLE

Case No.	Hospital Number	Name of Patient	Age	Civil State	Para.	First Symptom	Result of Examination
12	Augustana 38223	Mrs. Pauline H.	48	W.	O	June, 1912 Hemorrhages	Cancerous ulcer involving vagina. Very cachectic.
22	Augustana 39778	Mrs. Emilie K.	66	M. 43	II	Jan., 1914 Hemorrhages	Ulcer left side of cervix involving left vaginal wall. Uterus fixed.
24	St. Mary's 24096	Mrs. J. McC.	47	M.	O	For three mos. Hemorrhage	Cervix forms a crater. Uterus firmly fixed. Mass in lig. lata.
26	St. Mary's 23957	Mrs. E. M.	52	W.	I	For one-half yr. Menorrhagia	Cervix and vagina one crater extending into lig. card.
29	Augustana 40202	Mrs. M. R.	43	M.	III	Sept., 1913 Hemorrhages	Ulcer right half cervix extending into right lig. latum and vagina.
31	Willard 27036	Mrs. John S.	50	M.	I	Jan., 1910 Hemorrhage	Uterus a mere shell, firmly adherent to rectum. Recto-vaginal fistula.
32	Augustana 39321	Mrs. Ingeborg T.	53	M.	I	For six mos. discharge. For 1 mo. Hemorrhage	Crater of cervix invading post-vaginal wall.
34	Augustana 39469	Mrs. L. W.	35	M.	O	Pain and Hemorrhage	Cervix ulcerated. Vaginal vault invaded. Infiltration of parametrium.

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L. G. Cole states that an erythema dose may be attained in one minute with a three-millimeter aluminum filter. The entire application of 350 erythema doses could, therefore, be made within 6 hours.

THE POSSIBILITY OF INCREASING THE INTENSITY AND PENETRATION OF THE GAMMA-RAYS OF RADIUM BY EXCOCHLEATION AND CAUTERIZATION OF THE CANCER GROWTH.

The extent of the intensity and penetration of the gamma-rays of radium may be increased by the removal of the cancer-tissue by the sharp spoon and the cautery iron. This procedure is especially practicable in the proliferating, cauliflower growth of the cervix. Cauterization has been performed in every case in our series in which such a procedure was not contra-indicated. The result is a decided reduction in the extent of the new-growth, a corresponding increase in the penetration of the rays, and a decrease in the duration of the exposure to the gamma-rays. It is a purely economical question and has no other influence on the result of the radium treatment.

Case No.	Date of First Symptom	Date of Treatment	Mg. Hours	Primary Result	Date and Character Surgery	Present Condition
12	June, 1912	5-30 to 9-24-14	10375	7-3-14 Subjective cure	11-13-13 Cautery	Died March, 1915
22	Jan., 1914	5-12 to 7-5-14	6320	Good	4-22-14 Cautery	Died Jan., 1915
24	Jan., 1914	4-18 to 8-16-14	7500	Good	3-18-14 Cautery	6-17 became worse. Now refractory. Died.
26	1912	4-2 to 6-11-14 7-20 to 27-14	7875 3100	Good	3-8-14 Cautery 7-14 Abd. Hyst.	Died from invasion of rectum.
29	Sept., 1913	6-7 to 8-5-14	9250	Good	8-5-14 Abd. Pan-hysterect	Died 11-20-14.
31	Jan., 1910	4-4 to 6-17-14	8312	Good	1910 Cautery	Oct. 10, 13. Colostomy. Died Dec. 14. Metastasis Liver.
32	11-1-13	4-1 to 9-9-14	9043	Good	3-5-14 Cautery 4-21 Abd. Hyst.	4-1-16 Well.
34	Dec., 1913	4-1 to 7-31-14	8700	Good	3-19-14 Cautery 6-11-14 Abd. Hyst.	Died Aug., 1914. Carc. vesicae.

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TABLE II—Continued.

35	Augustana 40568	Mrs. W.	48	M. 30	XIII	For five mos. Menorrhagia	Mass involving uterus, vagina parametrit. Myocarditis with discompensation.
39	Augustana 41305	Mrs. Lillian R.	39	M. 9	II	July, 1914 Hemorrhages	Cervix, large indurated ulcer extending to vagina all around
40	Augustana 41221	Mrs. A. N. S.	53	M.	I	June, 1914 Menorrhagia	Ulcer involving cervix and vagina all around.
45	Wash. Bvd. 8902	Miss M. R.	53	S.	O	Oct., 1913 Hemorrhage	Advanced cachexia. Entire pelvis, including vagina form one mass.
50	West Side 28985	Mrs. M.	48	M.	O	Mar., 1914 Hemorrhage	Uterus size of fist. Mass ex- tends to left bony pelvis. Advanced case.
65	Augustana 41944	Mrs. R. T.	49	M. 24	III	For two years pain in pelvis.	Crater involving cervix, vagina and lig. card.
73	Post Graduate	Mrs. Julia H.	43	M. 27	XV	For three years. Discharge	Crater involving cervix and ant. vaginal wall. Advanced cachexia.
80	Augustana 42538	Mrs. Charlotte L.	55	M. 30	O	For three mos. Hemorrhages	Cervical stenosis due to tumor. Pyometra.
81	Norwegian Deaconess	Mrs. Johanna W.	63	W.	VI		Ulcer of cervix, involving vesicovaginal septum and lig. card.
83	St. Mary's 27649	Mrs. J. S.	65	W.	V		Mass involving cervix and lig. card.
88	St. Mary's 27978	Mrs. Nellie DeR.	56	M. 37	II		Mass involving cervix and right parametrium.
98	St. Mary's 28355	Mrs. Anna V.		M.		For two years. Discharge	Uterus mere shell, adherent all around. Advanced ca- chexia.
110	St. Mary's 28457	Mrs. Jadwiga G.	36	M. 16	VIII	Oct., 1914 Hemorrhage	Crater involving entire uterus and vagina.
115	St. Mary's 28866	Mrs. A. W. B.	50	M. 32	V	Dec., 1914 Hemorrhage	Advanced cachexia. Crater in- volving vagina, uterus, rec- tum, bladder.
120	St. Mary's 29049	Mrs. B. T.	48	M.	V		Advanced cachexia. Crater cer- vix, vagina, parametrit.
113	Augustana 43556	Mrs. F. E. P.	47	M.	I	Dec., 1914 Hemorrhage	Ulcer of cervix. Uterus fixed.
128	Augustana 44110	Miss M. F.	41	S.	O	For one month Dysuria	Ulcer involving cervix and up- per half of vagina.

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35	Feb., 1914	7-19 to 8-9-14	3750	Refractory		Died Aug. 9, 1914. Discom- pensation of heart.
39	July 1913	10-17 to 22-14	4000	Refractory	10-7-14 Cautery	Died Dec., 1914.
40	June, 1914	10-19 to 11-1-14 2-9 to 11-1915	6800 1200	Good	9-26-14 Cautery	Died March, 16. Metastasis of Femur.
45	Oct., 1913	11-6 to 12-3-14	8850	Refractory	None	Died Dec. 14. Very ad- vanced case.
50	Mar., 1914	11-27 to 11-30-14	4150	Refractory		Developed infection. Died Dec., 1914.
65	Jan. 6, 1914	1-21 to 24-15	3500	Good	1-6-1915 Cautery	Vesicovaginal fistula. Died.
73	Jan., 1912	2-6-15	4800	Refractory		Refused further treatment. Died.
80	Jan., 1915	3-12 to 26-15	2925	Good	3-10-1915 Cautery	4-6-16. Well Working.
81		3-15 to 3-1915	1700	Negative	3-15-1915 Excochleation	3-26-15. Died from sepsis.
83		3-20 to 4-26-15	4550	Good	7-16-1915 Cautery	Recurrence Jan., 1916. Did not return for treatment.
88		4-15 to 5-5-15	5650	Well 5-26-15	4-15 Cautery	Died July, 1915, after oper- ation for pyonephrosis.
98	Two years	5-18 to 27-15 6-10 to 8-24-15	3050 3400	Well	Very advanced case	Mar. 27, 16. Well.
110	Oct., 1914	6-4-15	2400	Immediate- ly int. vag. fistula	12-3-14 Cautery	Died. Further treatm. con- sidered useless.
115	Four years	7-8-15	1750	Refractory		Died 7-12-15. Very ad- vanced cachexia.
120	Dec.	7-23 to 8-29-15 9-20	3350 1050	Refractory		Very advanced case. Died.
113	Dec., 1914	6-1915 8-28-15 3-29-16	2100 300 1000	Well		3-27-16 Well.
128		8-17 to 8-26-15 9-16 to 1-31-16	1925 4675	Good		Died from sepsis after ap- pendectomy and hysterec- tomy. 1-16.

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TABLE II—Continued.

141	Augustana 44801	Mrs. Anna R.	50	M.	O	For three months Dysuria	Involvement of cervix, entire vagina and vesicovaginal septum.
149	Willard 29858	Mrs. Katie M.	48	W.		For three years Hemorrhages	Advanced cachexia. Crater involving cervix and vagina.
147	Post- Graduate	Mrs. Mamie S.	58	W.	I	Purulent at times bloody, discharge	Uterus fixed in a mass involv- ing parametrit. Cervix and vagina present ulcer.
152	Augustana 45181	Miss S. A. S.	45	S.	O	Oct., 1915 Pain	Involvement of cervix and entire vagina.
161	St. Mary's 30939	Mrs. Dora H.	70	M. 53	VII	Discharge	Ulcer involving cervix, and vaginal fornices. Uterus fixed
162	Augustana 45549	Mrs. E. B.	52	M. 32	V	Discharge	Ulcer involving cervix and vagina, extending into para- metrit.
165	Augustana 45516	Mrs. E. B.	50	M. 35	II	Discharge	Crater involving cervix, ex- tending into left paramet- rium.
168	Augustana 45129	Mrs. F. M.	53	M. 33	○	Hemorrhage	Uterus has sloughed entirely. Vesicovaginal fistula.
172	St. Mary's 31395	Mrs. M. LaR.	49	M.		Hemorrhage	Crater involving vagina, cervix and infiltrating parametrit.
178	St. Mary's 31638	Mrs. B. G.	34	M. 10	O	Hemorrhage	Ulcer of post-cervical lip ex- tending into fornix; infiltrat- ing rectum.

It is advisable to perform a colostomy in rectal cancers. This renders the seat of the carcinoma clean, prevents absorption of septic and putrefactive material, gives the patient an invaluable relief, and makes the use of radium less obnoxious.

In vesical cancers in the male a suprapubic cystotomy should be done. The radium may then be inserted through the suprapubic tube. Injury to the posterior urethra is avoided, the use of operating cystoscopes becomes obsolete, and the objections on the part of the patient are obviated. However, the catheter procedure, as before mentioned, may also be used after a preceding dilatation of the urethra.

THE CLINICAL RESULTS.

Tables II, III, IV, V, and VI give the clinical history and result of every case treated. I have discussed the histological action of radium on carcinoma-tissue in one of my former monographs (1). The reader is kindly referred to the same.

The results of the radium treatment differ depending (1) on the organ involved, and (2) on the stage of the disease. The prognosis is

141	Three months	10-27 to 31-15 12-27 to 29	1200 2600	Good Good		Died Jan., 16. Post-mortem examination negative. No carcinoma.
140	Three years	8-15 to 24-15 11-12 to 3-18-16	2100 3225	Good Good	8-10-15 Cautery	3-25-16. Well. Working. Gained 50 lbs. in weight.
147	July, 1915	1-21 to 12-15-15	3800	Good		4-1-16. Well. Resumed her work.
152	Oct., 1915	12-3-15 12-24 to 3-11-16	2250 2900	Good Good	4-2-16 Fulguration of bladder papilloma	3-25-16. Genitals negative. Bladder papilloma.
161	Jan. 9, 1916	1-17	600		1-11-16 Cautery	Refused further treatment.
162	Feb., 1915	1-19 to 3-15-16	3700	Good	1-14-16 Cautery 2-16-16 Abd. Hyst.	5-1-16. Well.
165	Six weeks	1-26 to 2-10-16 3-3 to 3-18-16	2000 1800	Good Good	4-13-16 Panhysterectomy	7-12-16. Recurrence.
168	16 months	1-30 to 3-14-16	3550	Good	10-15-15 Cautery	Has large vesicovaginal fistula.
172	June, 1914	2-20 to 24-16 3-20-21	1700 1850	Good	8-2-15 Cautery	5-5-14. Free of pain.
178	Dec., 1915	3-2 to 4-1916 3-27	2400 1000	Good		4-30. Ulcer has healed. No indurations anywhere.

best in vesical, almost equally favorable in uterine and vaginal, and not so favorable, even poor, in rectal carcinomata. The value of the treatment varies, depending on the operability, inoperability, or recurrence of the disease. The time elapsed in all the cases enumerated is too short to permit a discussion of the curative action of radium. However, I have two cases which succumbed from an intercurrent disease after the inoperable uterine cancer had been clinically cured by radium rays. The result of the treatment, based on microscopic examinations, will be discussed at the end of this paper.

Inoperable carcinomata. Eleven clinical cures were obtained in 35 inoperable uterine, none in 6 inoperable rectal, and 3 in 4 inoperable vesical cancers. A clinical cure implies a complete subjective and objective cure of cancer as far as it can be determined by an exact palpation and a microscopic examination. Fourteen clinical cures were obtained in 45 inoperable pelvic cancers, i. e., 31.1 per cent. This percentage would have been much more favorable if hopeless cases had not been included. However, not a single case was refused the treatment. Seven uterine, 4 rectal, and 1 vesical, i. e., 12 cases, which are included in these 45 cases were far-advanced and in a terminal stage. The 31.1 per cent clinical cures would be raised to 42.4 per cent by deducting the twelve terminal cases from the total number of 45.

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TABLE III.—CARCINOMA UTERI RECURRENS.

Case No.	Hospital Number	Name of Patient	Age	Civil State	Para	First Symptom	Character of Recurrence and of Operation
13	Augustana 40717	Mrs. A. H.	61	W.	I	June, 1910 Discharge	Recurrens: Nodule in fornix Panhysterectomy vaginalis.
21	St. Mary's 24058	Mrs. M. K.			O	Since 1912 Pain	Abdominal supravaginal amputation. Involvement of entire vagina.
23	Augustana 39516	Mrs. McQu.	29	M. 9 yrs.		April, 1913	Abdominal hysterectomy. Involvement of vagina, vulva, perineum.
28	Augustana 40270	Mrs. Caroline	63	M.		May, 1913	Involvement of vaginal vault.
37	Augustana 40456	Mrs. T. M. P.	45	M.	O	Since Aug., 1912 Discharge	Abdominal hysterectomy. Mass in right parametrium.
48	Augustana 41612	Mrs. D. W. H.	54	M.	III	Since April, 1914 Haemorrhage	Abdominal hysterectomy. Involvement of scar in broad ligament.
71	Augustana 42319	Mrs. Mary M.	42	M. 22	II	Since June, 1913 Haemorrhage	Abdominal hysterectomy. Mass involving scar and right parametrium.
77	St. Mary's 27533	Mrs. Mary H.	33	M.	I	Haemorrhage	Vaginal panhysterectomy. Involvement of parametria.
79	St. Mary's 27590	Mrs. Ann C.	52	W.		Mar., 1913 Haemorrhage	Vaginal hysterectomy. Involvement of vagina.
105	Willard 29857	Mrs. Harriette E.	54	M. 36	III	Aug., 1913 Haemorrhage	Percy cautery. Abdominal panhysterectomy. Crater involving left parametrium.
116	Augustana 43718	Mrs. Ellen C.	60	W.	IV	Haemorrhage	Crater in vaginal vault
124	Augustana 44099	Mrs. Christine M.	38	M. 13	I	For one month Haemorrhage	Vaginal panhysterectomy. Ulcer in vaginal vault.
125	Augustana 44095	Mrs. Lulu C.	47	M.	O	For 2 years Abdominal Tumor	Abdominal panhysterectomy for papilloma ovarii. Parametria involved.
135	Augustana 44503	Mrs. Mary M.	25	M. 8	III		Vaginal hysterectomy. Vesicovaginal fistula, vaginal vault.
176	Augustana 45966	Mrs. Caroline Y.	50	W.	IV	Ovarian Papilloma	Abdominal oophorectomy. Involvement of parametria and vaginal vault.
182	St. Mary's 31944	Mrs. Cath. F.	52	W.	II	Oct., 1914 Sanguineous discharge	Crater and ulcer in left vaginal vault extending downward.

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Case No.	Date of First Symptom	Date of Operation	Date of Recurrence	Radium Date and Amount	Immediate Result	Present Condition
13	June, 1910	Jan., 1910	June, 1914	7-23-14 to 11-30-14 12000	Good	May 15. Died from inter-current disease.
21	1912	9-16 13	Immedi- ately	4-16 to 5-28-14 5700	Good	Died Sept. 21-14. Exhaustion.
23	April, 1913	Oct. 1913	Immedi- ately	4-25 to 5-13 3375	Refractory	Died. Vagina, vulva and perineum were involved. 10-14.
28	May, 1913	May, 1913	Jan., 1914	6-13-14 to 6-15 2275	Good	Did not return for treatment.
37	8-12 1912	8-12 1912	Mar., 14	7-10 to 13-14 3500	Refractory	Died August, 1914. Exhaustion.
48	May, 1913	11-22-13	9-2-14	11-22 to 11-24 220		Died from exhaustion and sepsis following cautery.
71	June, 1913	Oct. 1, 1913	Jan., 1914	2-15 to 5-13 8200	At first Sub. cure	Died with vesicovaginal fistula, Nov., 1915.
77		Aug. 21, 1914	Immedi- ately	3-5 to 3-19-15 4075	Refractory	Died.
79	Mar., 1913	Mar., 1914	Immedi- ately	3-10 to 4-5-15 3900	5-13-15 Good	8-28-15. Returns with recurrence. Non-refractory. Died.
105	Oct., 1913	6-19 15	July, 1915	6-1 to 11-15 3950 8-5 to 11-29 2100	4-25-15 Cautery 6-19-15 Abd. Hyst.	Well. 5-16-15.
116				7-9 to 11-11-15 7100	Good at first	Vesicovaginal fistula, 10-1915. 11-1915, haemorrhages. Died.
124	2-15-15	Mar. 26-15		8-13 to 12-20-15 5575	Good at first	December became rapidly worse. Died. 4-10-16
125	1-8-13	1-8-15		8-13 to 9-5-15 2350	Good	
135		8-1-15		9-24 to 26-15 2050	Good	Had vesicovaginal fistula after operation. Refused to return.
176	Dec., 1914	Dec., 1914	One month	2-28. 1000 3-13. 1100		3-11-16. Panhyerectomy, abdominal.
182	Oct., 1914	Apr. 14, 1915	Immedi- ate	3-29-16 2000		Apr. 28-16. Subjectively well.

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TABLE IV.—CARCINOMA UTERI OPERABLE

Case No.	Hospital Number	Name of Patient	Age	Civil State	Para	First Symptoms	Result of Examination
7	Augustana 41218	Mrs. E. B.	54	M	I	Menorrhagia discharge	Cauliflower growth of cervix, involving entire vaginal vault. Uterus fixed posteriorly.
17	Augustana 40944	Mrs. R.	39		O	discharge Menorrhagia	Nodule size of hickory nut on anterior cervical lip.
33	Augustana 39755	Mrs. Hilda F.	64	42 yrs. M.	V	For one year discharge	Ulcer involving cervix and posterior vaginal fornix.
82	St. Mary's 27560	Mrs. Belle J.	36	15	II	Microscopic evidence	Negative
90	St. Mary's 27982	Mrs. Jos. St. A.	49	25	V	For six months discharge	Cervix-crater extending into vaginal fornices, fixed to cardinal ligaments.
101	Willard 29417	Mrs. G. B. P.	53	33	II	For eight months haemorrhages	Cervix-crater invading vesico-vaginal septum and right ligament latum.
106	St. Mary's 27770	Miss D.	37	S.	O	Tumor formation vulva for 5 years	Nodules all through vulva, especially clitoris. Inguinal lymphnodes involved.
117	Augustana 43551	Mrs. Hattie H.	39	M.	VII	Haemorrhage since 4-15-15	Ulceration of entire cervix.
133	St. Mary's 29442	Mrs. M. P.	35	M. 14	V	Discharge 5 mos. Haemorrhage 1 month	Ulcer of entire cervix invading rectovaginal septum.
134	Augustana 44515	Mrs. E. W.	48				Ulcer involving cervical canal. Not invading surrounding tissues.
174	Willard	Mrs. K. H.	43	W.	VI	Uterine Haemorrhage	Adnexa negative. Uterus freely movable. Ulcer involving cervix.
41	Wash. Bvd. 8968	Mrs. Isaac B.	52	M.	O	Menorrhagia	Ulcer in fundus uteri. Bilateral adnexitis.

TABLE V.—CARCINOMA RECTI

Case No.	Hospital Number	Name of Patient	Age	Civil State	Para	First Symptom	Result of Examination
18	Augustana 39516	Mrs. Anna D.	32	M.	II	14 months Rectal hemorrhages	Involving perineum. Tumor obstr. Rectum 2 inches up.

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VOLUME SEVEN

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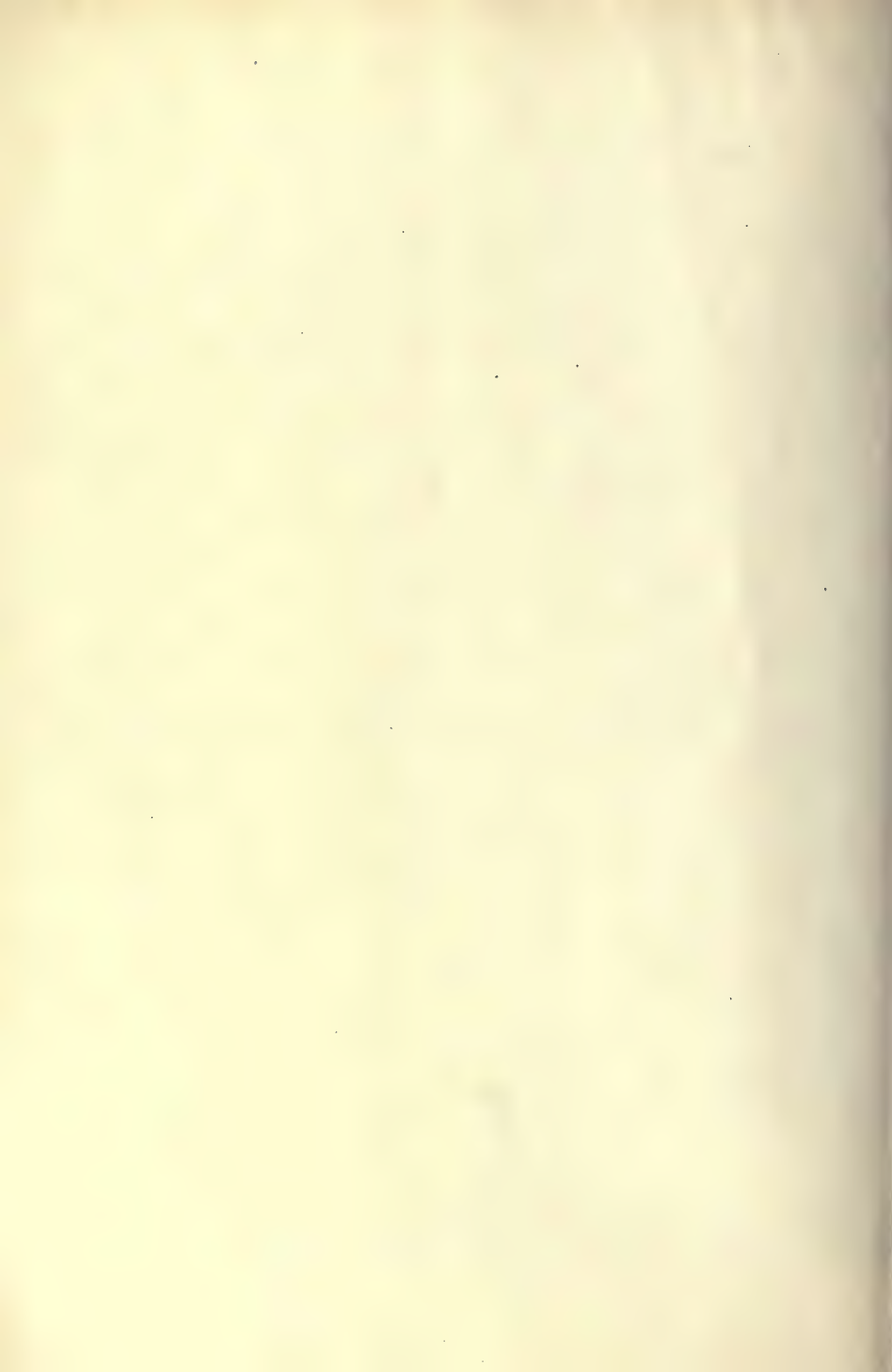
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TABLE IV—Continued.

Case No.	Date of First Symptom	Date of Operation	Radium Treatment	Mg. Hours to Date	Result to Date
7	Jan., 1914	9-25 1914	10-10 to 24-14	5200	Died Jan., 1915, from hemorrhage.
17	Jan., 1914	8-26 1914	9-16 to 11-17-14 6-14-15	6775 2400	8-26. Abdominal panhysterectomy. Vesicovaginal fistula. Died Feb., 1916.
33	Apr., 1913	4-20 to 24-14	5-15 to 30-14	3525	4-20 Cautery. 4-24 Abdominal panhysterectomy. Primary result good. Absecessed.
82		3-16 1915	3-21 to 3-28 1915	2550	Well, Mar., 1916.
90	Oct., 1914	4-16 1915	5-23 to 31 1915	4000	Well, Feb., 1916.
101	Aug., 1914	5-20 1915	5-23 to 30-15 Since received	4000 7375	2-15-16. Vesicovaginal fistula. Good physical condition, otherwise.
106	Jan., 1909	6-20 1915	6-30-15	2000	Carcinoma vulvae. 3-26-16 well.
117	April, 1915	6-18-15	7-18-15	1050	6-20. Panhysterectomy preceded by cautery
133			9-19-15	2400	Had a recurrence when treatment was begun. Died 12-20-15.
134		10-1-15 Abd. pan.	9-23 to 27-15 11-8-15	2350 600	Recovered.
174	Nov., 1915	2-14 1916	2-22 to 25-16	1750	4-28-16. No local evidence of any recurrence.
41		10-29 1914	10-21 to 23-14 11-11 to 13-14	4150	3-15-16. Well. No recurrence.

TABLE V—Continued.

Case No.	Date of First Symptom	Date and Character of any Surgery	Date of treatment	Mg. Hours of radium	Immediate Result	Present Condition
18	1901	Nov., 1913 Colostomy	6-1-15 1914	9900	Refractory	Died Nov., 1914.

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TABLE V.—Continued.

20	St. Mary's 25176	Mr. Ed. J. J.	56	M.		Rectal Haemorrhages	Ulcer 2 inches by 1 inch about 1 inch above sphincter.
38	Augustana 40349	Mrs. Lillian J.	26	M.			Rectum obstructed by tumor about 2 in. above sphincter.
70	Willard 28901	Mr. A. M.	52	M.		Pain in rectum. Constipation	Circular ulcer about 1 inch wide and 2 inches above sphincter
99	Augustana 43245	Mr. Joe St.	41	M.			Stricture of rectum about 1½ above sphincter
131	Augustana 44323	Mr. R. A. H.	70	M.			Ulcerating mass extending up to sigmoid
153	Augustana 45160	Mrs. G.	61	M.		Haemorrhages	Ulcer infiltrating perineal body, involving vaginal mu- cosa
157	German Deaconess	Mrs. H. Sch.	47	M. 22	III	For three years Haemorrhages	Irregular ulcerating mass in- volving rectum and vaginal septum
163	Augustana 45593	Mrs. Glen W.	32	M.	II	12-15	Tumor involving posterior va- ginal wall
173	Willard	Mr. John P. K.	61	M.		For 3 months Haemorrhages	Papilomatous mass in lower rectum

TABLE VI.—CARCINOMA VESICAE.

Case No.	Hospital Number	Name of Patient	Age	Civil State	Para	First Symptom	Result of Examination
19	Augustana 40405	Mr. John E.	74	M.		Dysuria Haematuria	Tumor involving trigone and extending into prostate
59	St. Mary's 26857	Mr. Anthony St.				Dysuria Ischuria	Recurrans. Papilloma origin: Trigone
69	St. Mary's 27096	Mr. Francis T.	58	M.		Dysuria Haematuria	Papilloma
107	Norwegian Deaconess	Mr. Alb. F. B.	40	M.		Tumor of ab- dominal wall	Recurrans. Tumor of bladder involving abdominal wall
150	St. Mary's 30484	Mr. Harley D.	40	S.		Pain radiating to left kidney	Tumor at left ureteral open- ing. Vesical stone
151	St. Mary's 30489	Mrs. E. T. H.	55	M.	I	Haematuria	Tumor of bladder wall invad- ing vesicovaginal septum Recurrans

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20	One year	7-2-1914 Res. of Rectum	7-29 to 10-31-14	2175	Recovered	Died July, 1915. Metastasis of liver.
38		Colostomy	7-29 to 8-8-14	1125	Refractory	Severe rectal tenesmus prevented further treatment. Died 11-28-14.
70	Dec. 1, 1914	Refused Colostomy	2-12 to date	17875	At first good result	Mar. 16. Patient cachectic.
99		8-1914 Colostomy	5-19 to 7-30-15	4200	Refractory	Died.
131		10-4 Colostomy 9-3 Resection	9-11-15	2100		Advanced case.
153			12-6 to 1-25-16	3950	Subjectively good	3-22-16 Reports rect. vag. fistula subjectively very good.
157	Three years	12-23-15 Colostomy	12-31 to 2-14-16	2825	Refractory	4-25-16. Reported in an improved condition.
163		12-15 Kraske	1-21 to 3-16-16	1400	Prophylactic	4-29-16. Reported well. Examination negative.
173	Three months	2-5-16 Resection	2-17-16 3-11-16	250 600	Good	Rectovesical fistula closed.

Case No.	Date of First Symptom	Date and Character of any Surgery	Date of Treatment	M. G. Hours of Radium	Immediate Result	Present Condition
19	1911	7-17-14 Perineal Cystotomy	8-3 to 9-1 1914	3150	Improved	Died Dec., 1914.
59	1903	1903 Cystotomy 1910 Cystotomy	12-31-14 1-24-15	2450 1150	Bladder Improved	12-31-1914. Suprapubic cystotomy. Died 1915. Metastasis femur.
69		1-25-15 Cystotomy	1-31-15	2400	Well	11-1915. Well.
107		Inoperable	5-18 to 5-30-15	1900	Refractory	Died. 6-1915. Advancedly cachectic.
150		12-3-1915 Cystotomy	12-3 to 25 to 1-28-16	2400 200	Good	Bladder functionates normally. Cystoscopy negative.
151	1909	5-10-15 Removal of tumor	12-2 to 9 12-23 to 26	2000 2300	Good Good	2-14-16. Reported in good condition. Recurrs.

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TABLE VI—Continued.

156	German Deaconess	Miss Helen P.	35	S.	O	Dysuria. Fre- quent urinations	Recurrans; mass involving left bladder wall, post., another ant.
170	Augustana 45647	Mrs. Milly St.	53	M. 30	II	Vesical tenesmus	Tumor involving neck of blad- der, entire urethra, and vesi- covaginal septum

The time elapsed since the beginning of the treatment in the four-
teen clinical cures is as follows:

Case No.	Months	Remarks
32	24	Hysterectomized
98	11	
113	10	
128	6	Died from an intercurrent disease
141	4	Died from an intercurrent disease
140	9	
117	6	
162	4	Hysterectomized
165	4	Hysterectomized
168	3	
178	2	
69	14	
150	4	
170	4	

The favorable and palliative action of radium in inoperable cases is truly remarkable. There does not exist another remedial agent in our entire therapeutic and surgical armamentarium the application of which is followed by better results. Radium will bring about these results without any immediate or remote dangers to the patient provided the strictest asepsis and a perfect technique are employed.

Recurrent carcinomata. The primary results in recurrent cancers are as follows: Fifteen recurrent uterine, 1 recurrent rectal, and 3 recurrent vesical carcinomata were treated. Four of the uterine cancers are clinically well. The recurrent rectal cancer was in an advanced stage at the beginning of the radium treatment and remained refractory. One vesical cancer (107) was in a terminal stage when referred for treatment, one (157) was clinically cured, and another one (156) had remained refractory. The bladder was apparently improved by the radium applications but a metastatic tumor in the right lateral pelvis does not respond to the most powerful roentgen raying. Five of the 19 recurrent cases are clinically cured, i.e., 25.8 per cent. If the five advanced and hopeless cases are subtracted from the above total, then the per cent of clinical cures would be 35.7.

The elapsed time since the beginning of radium treatment in the clinically cured recurrent cases is:

Case No.	Months
105.....	10
125.....	8
135.....	7
176.....	2
151.....	5

156		2-24-25 Partial Cystectomy	12-30 to 1-5 1-29 to 3-5	2550 2400	Good Poor	4-1-16. Mass involving en- tire right parametrium..
170	Three weeks	Oct., 1915 Hysterectomy	1-29 3-16-16	1400 500	Good	Tumor disappeared.

The prognosis of radium treatment in recurrent cancers is, therefore, not as good as in the inoperable cases. Especial care is necessary in these cases to avoid injury of neighboring organs and contiguous tissues by the radium rays.

Operable carcinomata. The application of radium following radical excision of the uterus and adnexa for carcinoma is a purely prophylactic procedure. Carcinoma-cells that have become spilled throughout the wound area during the progress of the operation, or carcinoma-tissue that has been inadvertently left behind may, thereby, be effectually destroyed. This fact has induced surgeons to increase the percentage of operability of their cancer cases because of the possibility of subsequent radium application after the radical operation. Cases No. 90, 101, 106, 133, and 188 were really inoperable cases. Singularly enough the first three have done remarkably and are well, while the last two have not been benefited by the surgery and radium.

An opinion as to the value of radium in operable cases cannot be rendered. The improvement or cure must be credited to surgery. Otherwise the time elapsed since the operation is too short to permit an expression as to a permanent or anatomical cure. When these cases are followed up carefully and the character of malignancy is considered from the microscopic specimen and the local condition during operation, then the conclusion must be drawn that radium favorably influenced the primary result of the operation. Medullary epithelial-cell cancers occurring especially in young individuals may be given a respite for years, where formerly without the X-ray and radium they could not even be benefited by an operation and rarely left the hospital alive. The time elapsed since the operation and radium treatment is as follows:

Case No.	Months
32.....	13
90.....	12
101.....	11
106.....	10
117.....	10
134.....	7
174.....	2
41.....	18
163.....	6
173.....	2

Cases 162 and 165 succumbed to an intercurrent disease after a clinical cure of the uterine carcinoma had been obtained. The first case died from sepsis following an appendectomy and abdominal panhysterectomy. Microscopic examination of tissues removed from the uterus did not show carcinoma. Case 165 died suddenly from a dilatation of the heart. The pelvic organs, para- and perimetrium, the pelvic parietal peritoneum from the brim downward, also rectum, bladder, and urethra

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were removed post-mortem and *en bloc*. Microscopic examinations of all the tissues were made. None of the sections showed carcinoma-cells. This result is not interpreted as an anatomical cure of cancer, yet it demonstrates the remarkable changes caused by radium in carcinoma-tissue. Those parts which before treatment showed cancer-cells were now free from macroscopic and microscopic evidence of the disease (11).

SUMMARY.

1. The therapeutic action of radium depends on a correct technique, which must be based on a careful physical examination of each patient.
2. The result of radiumtherapy in inoperable and recurrent cancers surpasses those of any other known therapeutic agent.
3. The prophylactic use of radium in operable cancers increases the percentage of operability and probably the efficacy of the operative procedure.

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RADIUM EFFICIENCY IN NON-MALIGNANT SURGICAL CONDITIONS*

By ROBERT ABBE, M. D.,
New York.

Senior Surgeon, St. Luke's Hospital.

It will refresh our minds to divert attention from the popular hue and cry after a cancer cure by radium, by considering a few of the interesting list of non-malignant troubles which this remarkable agent has helped. It will be consistent with the aim of this most practical society that its members should be informed on practical results.

One interesting demonstration of the prompt curative action of radium and its permanent benefit is in *vernal catarrh*, in a disease considered intractable by oculists, as well as physicians. This affection of the eyelids is a conjunctivitis recurring each spring, and often lasting through the year when it has become established. The lids are hot, swollen, red and itchy. Photophobia often compels the patient to stay in a semi-dark room. The lids gum up and are glued together in the mornings with a sticky, often mattery secretion. On everting the upper lid there is seen a mass of granulation tissue standing far out from the under surface, and often grouped in bunches. This condition does not occur in the sulcus above the cartilage of the lid. By this it can be differentiated from trachoma.

I have treated in all ten cases which were recurrent for many years and can assert that the improvement always begins soon after the first treatment. Most cases had had extreme treatment by slicing off the masses, cauterization, and caustics before I saw them, and had become the *betes noires* of the oculists.

A uniform benefit and ultimate cure follow the judicious use of radium. Technically, a fifteen minute application of a tube of strong radium under the eyelid, moved back and forth, with a lead device to protect the cornea, repeated every month or two, constitutes the simple and rapidly helpful method. With a drop of cocaine, the most sensitive eye feels no pain. The cases I have so treated have now remained cured up to ten years, as shown in the case tonight. The method of its action is specific, in altering the hypertrophied cells of the mucous surface, which have made a veritable tumor structure.

The second interesting condition in which radium has no rival is in reducing *lymphoid tumor* tissue such as is found in tumors of the tongue called hemolymphangioma, and in other parts of the body. I have reported a series of these in a paper read before the American Surgical Association last spring, and will not even quote further from it here, but merely say that it is a triumph in a small group of formerly hopeless cases. Its selective action on the lymphoid cell growth is emphatically specific.

This overgrowth of one element of skin structure in the scheme of tumor formation is not unlike papillary warty growths which subside, like all *vocal cord papillomas* as you have seen tonight in the brilliant and permanent restoration of voice with perfect vocal cords five years after apparently hopeless conditions.

*Medical Record, Vol. 90, No. 2, July 8th, 1916, pp. 47-50. Read at a meeting of the New York Clinical Society, April 28th, 1916.

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Fig. 1. Typical vernal catarrh; this inveterate case had resisted every variety of scientific treatment by specialists, but was cured by radium.

Fig. 2. Best method of exposing the under surface of the eyelid to strong radium; this is placed in a groove at the end of a long lead cylinder covered by a celluloid holder. The cornea is protected by the lead beneath the groove holding the radium tube.



Fig. 3. This patient with papilloma of the larynx remains perfectly cured after one radium application, and sang with perfect voice five years after the treatment.

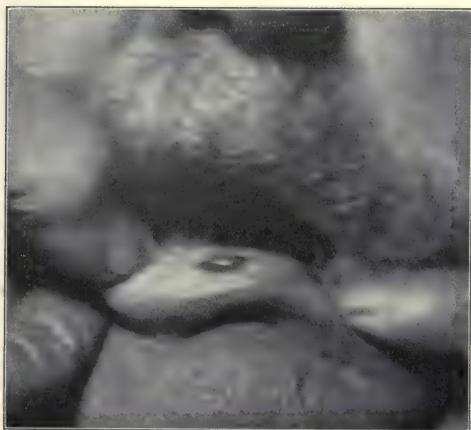


Fig. 4. Chronic abraded ulcer of the lip.

Warts, in places delicate as the edge of the eye lid, or the tender vermillion of a child's lip, or the coarse skin of the sole of the foot, or under the finger nails, or in the scalp, where scars are not desirable, radium has cured for me a hundred times with usually no scar. I would class this with specific action inasmuch as a retrograde of wrong-growing cells takes place after this atomic bombardment, causing them to return to normal growth.

Leucoplakia, considered as a simple overgrowth of surface cells of the tongue or mucosa lining the cheeks is not unlike the keratosis of the skin, heaping up in places and making a veritable new growth, often precancerous and tending to extend downward and become a cancerous invasion. This is seemingly as capable of cure by radium within the mouth as it is in skin hyperkeratosis, whose disappearance can be predicted with as much certainty as the treatment is easy. In the mouth, however, the time and method of application require much more judgment and skill to attain good results. It is associated with a transient painful irritation which is essential to success. We face the fact, however, that before radium was available no cure was known. Mr. Butlin once told me that "if radium would cure leucoplakia, it would do what neither cutting out, or shaving off, or caustics, or cautery had ever done in his hands."

An allied condition of the lips presents another phase of the successful use of this energetic agent. There is occasionally seen a weak spot of the skin of the lip, a chronic thin surface ulcer or abrasion. The skin refuses to heal, or if it heals with a thin surface, it quickly breaks down and *chronic abraded ulcer* remains, not with cut-out edges, but, as ice freezes, with a thin blue edge always looking as if it might heal. There seems in these cases to be a lack of force in the epithelial cells at the edge. It often lasts for years, and is in striking contrast to the hypertrophic conditions on the lip, both of which I illustrate, and both are equally well cured by radium. The same is true of the chronic painful crack of the lip.

RADIUM



Fig. 5. Small typical true keloid of the chest; it had been cut out, and returned, as they all do, before coming to me for radium treatment. This cured it with a smooth skin scarcely depressed.

It seems paradoxical that the same agent can cure an overgrowth keratosis and a deficient growth, as in these abrasions, and until we know why cells grow, we may not explain it. Some satisfaction, however, may be had in a hypothesis which I offered some years ago which argues backward from the known output of beta radiation of radium, an enormous charge of negative electron particles driven into the disorderly growing cells. Inasmuch as there follows a retrograde change in the overgrown cells, it must be due to something supplied to them by this treatment. If, hypothetically, we surmise that the vital force actuating a normal cell growth, is a balance of electric action established within it, and we conjecture that a riotous overgrowth may be due to loss of balance, may it not be that the preponderance of positive or negative charge is responsible for the disturbance which is corrected by the new supply of nascent negative electrons. Science is about ready to concede that the actuating force of nerve and cell activity is electrical, and singularly enough this new agent is almost wholly a discharge of material particles each bearing a charge of electricity, some positive and some negative. It is not easy to explain, for instance, the recovery of the destructive myeloid tumor of the jaw, which I showed you to-night, as a fortuitous reassembling of disordered cells to orderly rearrangement to form a normal jaw again which has endured for twelve years. This I would designate specific action. In what the specific action consists, we can only speculate.

By contrast, there is an action of radium which is curative by irritation only, as in *nevus*. The endothelium of veins or arteries undergoes hyperplasia and partly or wholly obliterates the lumen, so as to



Fig. 6. Extensive keloids following two years after an acid burn.

induce a gentle fibrosis and cure of the birthmark. Patience and discretion are needed to keep a velvety skin and not produce a cicatricial atrophy from overtreatment.

The active irritation of these intense penetrating rays is absolutely necessary to a successful result, in any of its many uses. This provokes a kind of inflammation, except that it has no bacterial origin. Especially noticeable is this in *keloids*, one of the most useful fields of its work. It was Wickham of Paris in his early work who first showed me cases of keloid cured by radium, and told me there was no difference between so-called true and false keloid; both were equally easy to cure. I have verified this in a great number of patients. Cases which no surgeon would dare cut out are perfectly cured by inducing, first, a sharp radium inflammation which transforms the hard keloid masses of cells and fibrous tissue. This is followed by an atrophy of the mass as the inflammation of the fourth week subsides. This is especially grateful in the so-called true keloids of the front of the chest, often seen in young women, which recur with terrifying certainty when cut out, but which invariably leave a thin, flexible cicatrix after radiumizing properly.

In the terrible case of face keloid from acid burns, which you have seen tonight, the condition two years after the accident was one of pro-

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gressive very dense hard masses much as if leather were drawn tight over a golf ball. Several sharp radiumizations were induced in all, and each was followed by marked softening and atrophy until now they are all soft and pale and nearly flat.



Fig. 7. Same patient as shown in Fig. 6, after radium treatment.

But I come at last to speak of the most extraordinary of all the remarkable effects of radium known to me—its cure of the disease known as *uterine fibroids*. It is fair to call this a disease by itself because it has no exact counterpart that I know of, in the body. It is essentially a tendency of the muscular structure of the uterus to grow tumors made up of the same muscle structure. One, or many, they are myomata; some old and fibrosed, some young and of juicy cell structure. Those growing close beneath the lining membrane of the cavity usually induce severe hemorrhages, often very grave. For forty years surgery has had but one answer to the appealing sufferer—"Cut them out, usually with the whole uterus also." It would be difficult to compute the hundreds of thousands so treated in the hospitals of the world.

The surgical results must include not only a great majority of satisfactory cures, but also deaths by hundreds from operative risks and the several sequels of pelvic abscess, abdominal wall abscess, hernia of the scar, cystitis from catheterization, femoral phlebitis, and so on. Add to this the four or six weeks of hospital care—which in private

means often a continual surgical attendance of many weeks more, where the patient is often more frail. The absence from work or home duties, in women who can ill spend the time, completes a long list of essential incidents associated with the customary surgery of uterine fibroids.

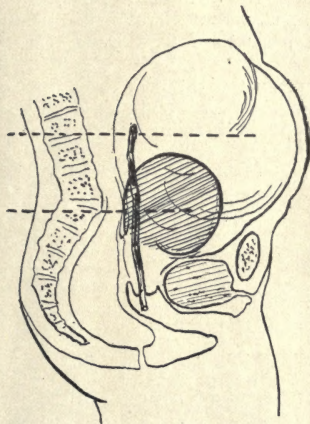


Fig. 8. To illustrate the action of radium on a large uterine fibroid. A, tumor before the application of radium; B, tumor ten months later.

Let us imagine, now, that a remedy for all this is found in so simple a treatment as the introduction of a small tube of radium into the uterine cavity, without ether, for two hours on two or three occasions, without entering a hospital, and that, following this, the excessive hemorrhage stops and the tumors progressively shrink until they disappear. Is this possible? It is not only possible, but has come to the point of complete demonstration. Accumulated cases now show that it may be depended on for permanent cure, with apparently no risks, no delay, no hospital, small cost to the patient in time and money; and to the surgeon, small cost of time. It sounds like a Munchausen tale. It is one of the most beneficent actions of this unique agent.

My experience with it dates back to 1905, which is the first case as far as I know in which it was used to arrest a hemorrhage and for its hoped for good effect on the tumor. That and another which followed soon after were recorded by me in 1906, and have been watched ever since. The tumors shrank year after year until they remained but very small, inert buttons on the uterus. Since then I have applied it in more than thirty cases and have yet to see a case which did not shrink, some completely, some rapidly—all in large measure. It may truly be called a specific for uterine fibroids, and must supplant operative treatment as fast as conviction and the accession of radium come to operators.

Its special value shows in the many cases of violent hemorrhages from fibroid disease. Here the uterine lining is overgrown and highly vascular, or stretched out thin and bleeding from open mouthed veins. The contact of radium with these blood vessels seals them up by occlusive inflammation, due to the active beta rays, while the penetrating gamma rays go through the whole disordered cell mass, and produce a

retrograde change in the conduct of each cell so that it begins its retreat at once, and the growth's shrinkage is measurable in from two to six months.

The very large tumor in a desperate case of hemorrhage, published by me last June, has shrunk from a diameter of ten inches to four, in ten months, and will disappear probably within a year. Meanwhile the exhausting hemorrhages ceased in six weeks and have never recurred. The patient has enjoyed perfect health since. This may be said of all the cases treated.

One patient whom I have shown you tonight with the most extensive *lupus erythematosus* of the entire face, ears, and side of the neck, and of his hands, was cured by one thorough radium treatment. This case does not stand alone.

It is probable that every case will yield to proper radiumization, judging by five cases of this disease on the face which have yielded excellent results which seem permanent. The first case was of a man who had typical patches on both cheeks. He remained cured after my treatment in 1904.

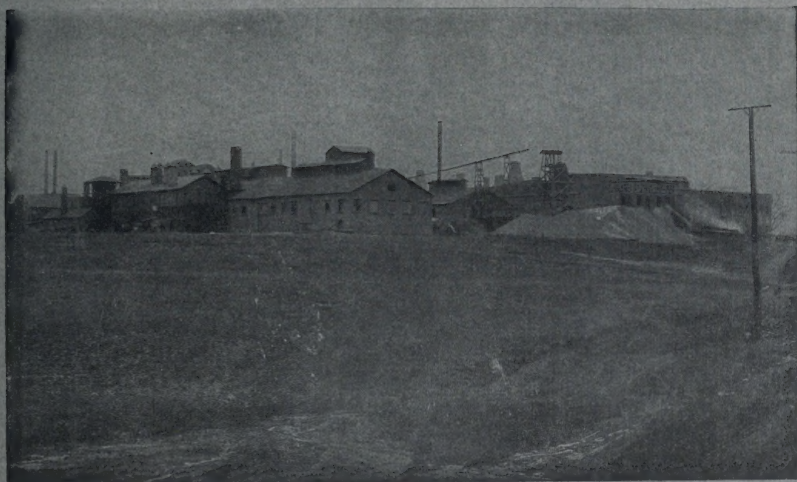
Time has limited me in this paper to speaking of only a few of the non-cancerous cellular growths in which the action of this comparatively new agent—radium—has a character of its own.

REVIEWS AND ABSTRACTS.

George M. Mackee, (New York). Progress in the Treatment of Skin Diseases. N. Y. Med. Journ., Vol. CIII, No. 10, pp. 441-4. March 4, 1916. "Radium is now being extensively employed in the treatment of skin diseases. There is a decided misunderstanding relative to the comparative value of radium and the X-ray. It should be remembered that there are rays emitted from radium that have varying characteristics, which is also true of the rays from an X-ray tube. The gamma rays of radium are of all degrees of penetration. Some will pass through almost anything if afforded sufficient time. Then there are gamma rays that possess very little penetrating power. The rays emitted from an X-ray tube, practically speaking, are analogous to the gamma rays of radium, but there is a greater degree of latitude in the penetrability of the gamma rays. In addition, in the case of radium, it is possible to utilize the very marked therapeutic effect of the beta rays. The beta rays produced in the X-ray tube cannot be used because they will not penetrate the glass wall of the tube. Now there are some dermatological conditions that respond more readily to the gamma rays of very low penetration and to the beta rays than to the more penetrating rays from an X-ray tube. It is this difference that accounts for the superior efficacy of radium, compared with the X-rays in certain dermatoses. Therapeutic experiments with exceedingly "soft" gamma rays, and with the beta rays obtained from the X-ray tube, are now being conducted, and the indications are that the results will be identical with those obtained with radium. Radium has produced very superior results in the treatment of deep seated vascular naevi, but it is not so efficacious in the port wine mark. It is of use in leucoplakia and lupus erythematosus. In these conditions it is at present superior to the X-ray. In inaccessible locations radium can be used to advantage, but where extensive surfaces are to be treated the X-ray is indicated."

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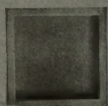
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